

REMARKS

The Office Action of February 27, 2007 has been received and carefully considered. However, Applicant respectfully traverses the rejections cited in the Office Action for the reasons explained below. All claims are now present for examination and favorable reconsideration is respectfully requested in view of the previous amendments and the following comments.

REJECTIONS UNDER 35 U.S.C. § 102:

Claims 1 – 4 and 8 – 16 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Imanishi et al. (US Pat. No. 6,054,209), hereinafter Imanishi. Claims 1 – 3, 7 – 9 and 13 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Kumaki et al. (US Pat. No. 6,617,381), hereinafter Kumaki.

Applicant traverses the rejection and respectfully submits that the presently claimed invention is not anticipated by the cited references. The object of the invention according to Imanishi (USPTN 6,054,209) is to provide an easy tearable film which can be torn easily at least in one direction, no orientation process is needed when preparing thereof. At the same time, the film should have a high tensile strength in the orthogonal direction relative to the first direction, and have a practically usable strength and tensile force in any direction. At the same time, the easy tearable film can be produced by use of conventional polymeric materials **without a special ones**. Finally, the film should be excellent not only in tear properties but also in transparency. Imanishi also teaches a method of producing such film (column 2, lines 35-56).

The object of the present invention is to provide a film **for food products** having **high permeability** with respect to smock substances (phenol permeability) **and/or** water vapors (vapour permeability). However, Imanishi does not disclose such object and the problem of providing a film with high phenol and vapour permeability.

Thus, the **objects of the inventions are different and do not relate to each other**. Namely, the fact that a film is **easy tearable** does not mean that the film also has high permeability in respect to smock substances and/or water vapors.

To achieve the technical result according to Imanishi (see Claims, column 33, line 48 - column 34, line 59) it is necessary that the film should

1) consist of at least two resin materials selected from specified classes of polymers listed in items a) and b) of claim 1; and

2) have an islands-sea structure (a continuous phase and a dispersed phase).

The two above-mentioned features are necessary and sufficient to achieve the technical result – providing an easy tearable film. The claims do not impose any special requirements on resin material forming the dispersed phase, for example, to be solid or water soluble.

To achieve the technical effect of the present application (10/671,489) it is necessary that the film should be formed from polymer composition consisting of a polyamide material and a **hydrophilic compound** which forms in the polyamide matrix a highly dispersed phase with a linear domain size of 0.1-3.0 μm in a direction perpendicular to a surface of the film. Thus, the component providing high permeability of the film with respect to smoke substances and/or water vapors and forming a highly dispersed phase should be selected **from special compounds**, i.e. from **hydrophilic compounds**, which should be **solid and soluble in water at 20°C** (see claim 1).

It should be noted that **hydrophilic compound** according to the present invention should not be necessarily a polymer, on the contrary, it can be selected from the group consisting of inorganic salts and salts with an organic anion and an inorganic cation (see claim 5). Imanishi, however, requires a composition of at least **two polymer materials**.

Thus, the technical results, which are different and not linked to each other, are achieved by means of the different essential features.

According to claim 1 of Imanishi the following combinations of polymer materials are used:

1. one styrenic polymer plus a polyester or a polyamide; and
2. one polyester plus one polyamide or an acrylic polymer.

In the present application:

1. a combination of polyamide and hydrophilic compound.

Imanishi does not teach that either styrenic polymer or **polyester** is a **hydrophilic compound** within the meaning of the present application, namely, that they

are solid and soluble in water at 20°C, i.e. that they are characterised by the distinctive features of the present invention.

The hydrophilic compounds according to the present application listed in claim 4 relate, according to Imanishi, to the following kinds of polymers: vinyl polymers (selected from homopolymers and/or copolymers of vinylpyrrolidone, vinyl alcohol, vinyl ethers, and vinyl esters)(see column 5, line 59- column, 6 line 1); acrylic polymers (selected from homopolymers and/or copolymers of acrylamide, acrylic acid, and methacrylic acid (see column 5, lines 40-44); olefinic polymers (selected from homopolymers and/or copolymers of maleic anhydride) (see column 4, lines 10-17), but they **do not relate to styrenic polyesters and polyesters**. The polymers selected from homopolymers and/or copolymers of alkylene glycols, alkylene oxides relate to **ethers rather than to esters** as Imanishi teaches, and are not considered in Imanishi.

Thus, to achieve the technical result Imanishi uses polymer materials combination which differs from the combination required to achieve the technical result according to the claimed invention.

Imanishi teaches that “the continuous phase and dispersed phase or micro domain may be formed by a film-forming procedure of a resin composition comprising, as main components, two or more of thermoplastic resins different in a repeating unit” (see column 3, lines 64-67). Further follows a list of acceptable thermoplastic resins including polyamides and water soluble polymers (see column 4, line 1 - column 10, line 52), from which a film can be formed by means of the certain procedure. This procedure, which involves mixing the melted polymers with subsequent extrusion of the melted mixture into the film, is disclosed at column 18, lines 64-67. However, Imanshi makes a remark that the polymers different in the repeating units is employed in a suitable combination (*rather than in any combinations*) (column 10, lines 53-55). The “suitable” combinations obviously include the combinations mentioned in the claims and in the description of the preferred embodiments of the invention (column 11, lines 13-58; and column 15, lines 18-26). Among those combinations there are missed mixtures of polyamides and water soluble polymers; vinyl polymers, such as polyvinyl alcohol, are not mentioned at all among the preferred polymers forming the dispersed phase.

On the other hand, the above list comprises combinations, which cannot be regarded as “suitable”, for example:

1. The arbitrary selection of components from said list to form **the matrix (continuous phase)** of the extrudable composition results in unrealizable problem, if, for example, for such purpose one selects homopolymers of maleic anhydride (MA) or (meth)acrylic acid (AA and MAA), which cannot be melted or softened without being degraded under heat. In this case the second component does not matter.

Thermal properties of homopolymers of MA, AA and MAA are disclosed for example, in "Encyclopedia of Polymers" Moscow, "Sovetskaya Encyclopedia", 1972, vol.1 Page 39; vol.2, page 137 and 187, (see citations ^{1,2,7,8,9} from "Encyclopedia of Polymers" and the translation of marked extracts").

2. The above mentioned list comprises mutually reactable polymers, whose reaction in the melt will result in forming of cross-linked nonfusible product, which make it impossible to extrude them together in a blend. The attempt to mix them in the melt most likely will result in the extruder failure. This is the reason why it is impossible to mix in the melt, for example, homopolymers and copolymers of vinyl alcohol and copolymers of maleic anhydride or (meth)acrylic acid. Films comprising such components are known from the prior art, however they are manufactured only from solutions and are cured (cross-linked) under the temperatures below the melting point of polyvinyl alcohol or the most of copolymers thereof (see, for example, USPN 5,552,479 or USPN 2,169,290).

3. The above mentioned list comprises polymers, which cannot be mixed in the melt due to their thermal incompatibility. Thus the homopolymers of vinyl acetate (polyvinyl acetate - PVA) (see column 6, lines 12-13) and acrylonitrile (polyacrylonitrile - PAN) (see column 5, lines 43) - start to degrade above 160-170C°, wherein above 190-250C° they degrade very rapidly transforming into completely different substances. The same list also comprises such high-melting polymers as polyethylene sulphate (PES) or polyamide 46 (PA 46) having melting points above 280C°, and treatment temperatures above 290C°. Upon degrading of unstable polymers there are produced volatile and gaseous products (acetic acid, vinyl acetate, ammonia, hydrogen, etc.). Therefore, the produced extrudate will be in form of foamed mass, which could hardly be formed into a solid monolayer film.

Properties of PAN and PVA are disclosed, for example, in "Encyclopedia of Polymers" Moscow, "Sovetskaya Encyclopedia", 1972, vol.1 pages 43-44 and pages 386-387, (see citations ^{3,4,5,6} from the enclosed translation).

For properties of PES see:

<http://www.matweb.com/search/SpecificMaterial.asp?bassnum=O2390>

For properties of PA 46 see:

<http://www.matweb.com/search/SpecificMaterial.asp?bassnum=O4500>

Meanwhile, most of the hydrophilic polymers listed in the present application, for example, polyvinyl alcohol and polyvinylpyrrolidone, also have limited thermostability and thermoplasticity. Their degradation temperatures are, according to different sources, from 200C° to 230C°, wherein the recommended treatment temperature of PA 6.66 is about 230-250C°. (Polyoxazoline, the only one from the listed hydrophilic polymers, has the high thermostability and is not mentioned in Imanishi). Therefore, the possibility to obtain an integrated monolayer film having high mechanical strength from their mixtures with polyamide is not obvious for a person skilled in the art. Such possibility established in the claimed invention **is itself unexpected and unpredictable, and does not follow from Imanishi.** The known facts of producing multilayer films with the layers comprising such mixtures do not contradict the above statement, since the extra layers can provide the multilayer film with necessary integrity and strength even in the case of degradation of the mixture components.

Regarding to thermostability of polyvinyl alcohol and polyvinylpyrrolidone see, for example, "Encyclopedia of Polymers", vol.2 page 790, and vol.1, page 431, citations ¹⁰ and ¹¹; an also **USPN 5,137,969, Marten, et al, (August 11, 1992).** Regarding the treatment temperature of PA 6.66 see, for example,

<http://www.matweb.com/search/SpecificMaterial.asp?bassnum=PALA27>

Thus, Imanishi does not provide any evidence of possibility to manufacture a single layer film having the certain morphology from the mixture of polyamide and hydrophilic polymers. Such film is mentioned neither in the examples nor in the description of the preferred embodiments of the invention. Imanishi only supposes if such film might be manufactured it would be an easy tearable one.

Regarding differences in film properties:

Imanishi teaches(column 15, lines 1-2) that the film can be easily torn by hand almost straightly in at least either of the directions without whisksers, however, it cannot be done with the claimed film. "The film of the invention is characterized in that, even when unstretched, it **can extremely easily be torn in the orthogonal** direction relative to the film drawing direction..." (column 17, lines 55-60). The present application discloses facts, which directly indicate that films from the mixture of polyamide and water soluble polymers, and satisfying the morphology according to both documents **are not easy tearable**, i.e. they do not comprise the main feature claimed in Imanishi (see the Claims) which compose the main object of Imanishi (column 2, lines 35-56). These facts are disclosed in the examples of the embodiments of the invention. The films according to examples 1-11 (including comparative examples) are used as sausage casings and filled under pressure of 3-5 atmospheres by means of conventional equipment used in a sausage factory. Furthermore, upon filling with sausage stuffing the casing is subjected to rubbing against metallic parts in the stuffing apparatus, which is accompanied by damaging of the casing surface (scratches, grazes, scuffing, etc). The same damages can appear upon the casing producing and the succeeding treatment thereof (application of printed image, shirring). It is obvious that a film that can be easy **tearable** in any direction, which imply that any film surface damage will propagate even under slight mechanical influence, cannot be filed with sausage stuffing under pressure by means of conventional equipment, since it will result in bursting of the casing. See, for example Nicholson et al, USPN 5,597,587: "Wet tear resistance is an important property for food casings as it is a measure of the ability of the casing to withstand abuse imparted by the rigors of shirring and stuffing. For example, it is not uncommon for poorly maintained stuffing equipment to nick or otherwise damage the casing during the stuffing process with the result that the casing tears and fails under the stuffing pressures. Consequently, it is important that the casing be able to receive some amount of damage without failing." (column 4, lines 19-25) ("wet tear resistance" is due to the fact that a casing is usually filled after previously being humidified). Unfortunately, Nicholson gives tear resistance in units (gm-cm/mm) which are incommensurable with Imanishi's ones.

On the contrary, an insufficient tear resistance is the considerable obstacle for use of the sausage casing, and increasing of tear resistance is the object of multiple inventions

related to sausage casings (see, for example Vicik et al, USPN 5,549,943, column 6, lines 28-30).

Schmal et al (application US 20030021925) teaches (see page 10, paragraphs [0103]-[0104]) that sausage casings may have moderate tear propagation values measured by Elmendorf method, however, they should have high graves tear values measured by graves method according to ASTM D-1004. This standard implies tearing of a sample cut at right angle, as well as JIS K 6732 for measuring the right angle type tear strength cited in Imanishi. See for example, http://www.ptli.com/testlopedia/subs/tear_close.asp - Teat Test - ASTM D1004. On the other hand, standard JIS K 6732 for tear resistance estimation is also known as "grave method" (see, for example, <http://rockblocker.com/laminxtech.htm>

According to Schmal, moderate and acceptable for sausage casings tear propagation values measured by Elmendorf method are 204-232 gm with the film thickness of 0.00225 inches (about 57 μ m), i.e. about 36-41 kg/cm (Imanishi mentions values below 10 kg/cm). Acceptable for sausage casings grave (right angle type) tear strength values is 560-728 gm/mil, i.e. about 229-298 kg/cm (Imanishi mentions values below 150 kg/cm) – see Schmal, page 10 Tables 6 and 7.

The applicant is in opinion that the above mentioned is suggested that the films according to Imanishi and the present application are not identical. Therefore, Amanishi cannot be regarded as anticipating the present application. The applicant respectfully requests the Examiner to withdraw the rejection under 35 U.S.C. 102(b).

Kumaki reference (USPN 6,617,381)

The polymer composition disclosed in Kumaki relates to higher-performance engineering plastics (column 1, lines 6-7). **An object** of the invention is to provide a polyamide resin composition **that is excellent in rigidity and toughness**, and that achieves excellent surface external appearance and dimensional stability of formed articles in good balance. The invention also relates to a method for producing the polyamide resin composition, and articles **formed** from the polyamide resin composition (column 1, line 66 – column 2, line 7).

It is obvious that polymer films for food products packing do not relate to higher-performance engineering plastics and are directed to different applications. Polymer films for food products packing, in particular, sausage casings, cannot be manufactured by forming since they require different technique. Furthermore, such **films should also have different properties**. A packing film should be at least flexible, and sausage casing should further be elastic since otherwise it would be impossible to obtain the dense sausage stick.

The object of the present application is to provide **a film for food products having high permeability** in respect to smock substances (phenol permeability) **and/or** water vapor (vapor permeability). However, Kumaki does not solve the problem of providing a film with high phenol and vapor permeability.

Thus, the **objects of the inventions are different and do not link with each other**.

To achieve the technical result of Kumaki (see claims 1, 5, 7, 11; columns 15-16) it is necessary that a blended polyamide resin composition comprises at least **3 components**:

(A) 100 parts by weight of nylon resin;

(B) 5-150 parts by weight of at least one inorganic filler having an average particle diameter of 0.05-10 μ m;

(C) 0.05-10 parts by weight of an olefin anhydride,

wherein it is essential for the invention that **the amount of polyamide resin component deposit remaining on said inorganic filler should be at least 4 g/m²**.

According to the present application, to achieve the technical effect of the present application, it is necessary that the film should be formed from polymer composition consisting of **a polyamide material and a hydrophilic compound** which forms in the polyamide matrix a highly dispersed phase with a linear domain size of 0.1-3.0 μ m in a direction perpendicular to a surface of the film, wherein the hydrophilic compound providing high permeability of the film with respect to smoke substances and water vapors, should be solid and soluble in water at 20°C (see claim 1).

Thus, the technical effect of the present application is achieved by using of polymer composition consisting of two components, wherein there is not required an

additional essential feature related to amount of polyamide resin component deposit remaining on inorganic filler.

Therefore, the different technical results which do not link to each other are achieved by the different essential features.

In item 6 of the Office Action the Examiner alleged that Kumaki et al teach that the structure claimed has the ability to be for food products. The applicant has not managed to find any support for this fact in Kumaki which also fails to mention in the examples that the composition according the invention is used for film manufacturing (see column 7, line 63 – column 8, line 34).

Further to the Examiner's objections:

1. The water soluble salts of the present application are not fillers in the ordinary sense of the term. Fillers are preliminary grinded powders, which then are dispersed in a polymer material, for example as it describe by Kumaki et al. It follows form the present application that the salts are not subjected any grinding down to 0.1-3 μm . According to the examples of the embodiments of the present invention, the salts are introduced into composition in their conventional form (in form of crystals having conventional size up to 50 μm or granules) and spontaneously form highly dispersed phase upon mixing with polyamide.

2. In addition, magnesium carbonate, calcium sulfate and barium sulfate are not water soluble salts. According to reference literature of public domain their solubility is 0.039, 0.225 (dihydrate), and 0.000245 gm in 100 gm of water, correspondingly (which corresponds to molarity of saturated solution of 0.014, 0.012, and about 10^{-5} M), whereas according to different conventional classifications water soluble salts are those having solubility above 1 gm in 100 gm of water, or having molarity of saturated solution above 0.1 M. As for water soluble salts, they do not present in the list of possible fillers according to Kumaki.

Regarding solubility of salts and classification thereof by solubility see, for example,

Solubility Table (http://en.wikipedia.org/wiki/Solubility_table)

Solubility Rules -

(<http://library.thinkquest.org/C006669/data/Chem/reactions/solubility.html>)

Solubility –

(<http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch18/soluble.php>)

Thus, the applicant is in opinion that Kumaki also cannot be regarded as anticipating the present application


Therefore, the pending claims are not anticipated by Imanshi or Kumaki and the rejection under 35 U.S.C. § 102 has been overcome. Accordingly, withdrawal of the rejection under 35 U.S.C. § 102 is respectfully requested.

Having overcome all outstanding grounds of rejection, the application is now in condition for allowance, and prompt action toward that end is respectfully solicited.

Respectfully submitted,

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Enclosures:

Copies of the citations from "Encyclopedia of Polymers" and English translation of marked parts (25 pages)